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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,861	11/12/2003	Yoshitaka Hamada	035576/271444	6729

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EXAMINER

VIJAYAKUMAR, KALLAMBELLA M

ART UNIT	PAPER NUMBER
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1751

DATE MAILED: 04/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/706,861

Applicant(s)

HAMADA ET AL.

Examiner

Kallambella Vijayakumar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

- Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.
- The amendment filed 06/28/2004 has been entered. Claims 1-16 are currently pending with the application.
- The examiner has considered the IDS filed 01/06/2005, 12/27/2005 and 01/24/2006.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1-4 and 9-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Burkett et al (J. Chem. Soc. Comm. 1996, pp 1367-1368).

The use of phrase "for forming a porous film" in the claim-1 has not been treated with patentability. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to

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the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Burkett et al teach compositions for forming mesoporous silica by co-condensation of a siloxane and organosiloxane from a mixture containing TEOS (Formula-1), OTES (Formula-2) and C16TMAB6 (surfactant) in water (Pg-1367, Col-1, Para-3, Table-1; Pg-1368, Footnotes). The amount of OTES was 10 mol% of the total siloxanes that meets ratio limitations in claims 3-4. With regard to claims 9-10, the examiner asserts that the prior art composition is identical to that by the applicants and will yield the claimed films of the applicants. All the limitations of the instant claims are met.

The reference is anticipatory.

2. Claims 1 and 5-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Yagihashi et al (US 2002/0132908).

Yagihashi et al teach a coating composition for forming an insulator layer over a semiconductor substrate that could be used as an interlayer of a semiconductor device comprising various tetrafunctional and trifunctional silanes containing C1-C12 hydrocarbon groups and a surfactant. The prior art teaches using admixtures of two or more silanes in the coating composition, and the silanes included tetramethoxysilane (Formula-1) and decyltrimethoxysilane (Formula-2) (Abstract, Para 0029-0032, 0042-0043). With regard to claim 5, the prior art teaches using sulfonic acid catalysts (Para 0046) (See Specification, Page-15, Line-15). With regard to method claims 6-8, the prior art teaches coating a film over the semiconductor substrate by spin coating the composition and heating the coated substrate at a temperature of 300-500C forming the porous film (Para 0059-0061). With regard to claims 9-10, the examiner asserts that the prior art composition is identical to that by the applicants and will yield the claimed films of the applicants (Para 0064). All the limitations of the instant claims are met.

The reference is anticipatory.

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3. Claims 1-10 are rejected under 35 U.S.C. 102(a/e) as being anticipated by Brinker et al (US 6,387,453).

Brinker et al teach forming a mesoporous, low dielectric constant, insulating thin film of silica by coating solution containing the reactants in a mole ratio of TEOS: ethanol:water:surfactant:TFTS of 1:22:5:0.004:0.092-0.31:0.039-0.1 (Abstract, Col-5, Ln 60-65;). TEOS and TFTS meet the limitation Formula-1 and Formula-2 alkoxysilanes in the claims. The surfactants included alkylammonium salts and sulfonates that meet the limitation of claims 2 and 5 (Col-3, Ln 53-Col-4, Ln 13, Col-4, Ln 18). The TEOS:TFTS ratios meet the ratio limitation in claims 3-4. With regard to the method claims 6-8, the prior art teaches coating a substrate and heating the films at about 250C to decompose the surfactant molecules (Col-4, Ln 34-37). All the limitations of the instant claims are met.

The reference is anticipatory.

4. Claims 1-2 and 6-16 are rejected under 35 U.S.C. 102(b) as anticipated by Egami et al (JP 2002-030249).

Egami et al teach the composition of silica coating liquid comprising (A). at least one silicon compound selected from the group consisting of alkoxysilanes of the general formula (i) $ZnSi(OR)_4-n$, and silane halides of the general formula (ii) $X_nSiX'_4-n$, wherein $X=H, F, 1-8C \text{ Alkyl}$; $R=H, 1-8C \text{ Alkyl}$; and $X'=halogen$; and (B). a quaternary ammonium organic template (Surfactant) (Abstract). The formula (i) encompasses tetraalkoxy silanes such as tetraethoxysilane and trialkoxysilanes such as octyl trimethoxysilane and octyl triethoxysilane that meets the limitation silanes of Formula-1 and Formula-2 in the instant claims 1 and 11 (Para 0015). The quaternary ammonium surfactant meets the limitation of claim-2. The prior art further teaches coating a semiconductor board or a silicon substrate in a semiconductor device with in between wiring layers of multilevel connection and heat treating between 50-300C and baking at 350-450C (Para 0044, 0047-0051) that meets the limitation of claims 6-11 and 16. The claim 11 is drawn to a semiconductor device comprising internal porous film of silica formable using specific reactant components in the coating media. With regard to product by process limitations containing specific components in claims 11-15, they pertain to the cocktail mixture forming silica coating

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composition from which the dielectric interlayer insulating layer of mesoporous silica is derived and not an essential component of the porous dielectric film, and the examiner asserts that the art device containing silica film with a dielectric constant of ≤ 2.5 is identical to that obtained by the applicants process, and "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). All the limitations of the instant claims are met.

The reference is anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of

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each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yagihashi et al (US 2002/0132908).

The disclosure on the composition and the method of forming a film by Yagihashi et al as set forth in rejection-2 under 35 USC 102(b) is herein incorporated.

The prior art fails to teach a semiconductor device containing an interlayer of porous film per the claim-11.

However, the prior art teaches that the art film can be used as interlayer insulating layer in a semiconductor device (Abstract), and it would have been obvious to a person of ordinary skill in the art to use the art film in a semiconductor device with reasonable expectation of success.

2. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yagihashi et al (US 2002/0132908) in view of Brinker et al (US 6,387,453).

The disclosure on the composition and the method of forming a film by Yagihashi et al as set forth in rejection-2 under 35 USC 102(b) and rejection-1 under 35USC 103(a) are herein incorporated.

The prior art is silent about the specific surfactants in the composition.

In the analogous art, Brinker et al teach the organoalkoxysilane coating compositions containing alkylammonium salts and sulfonate surfactants in making porous low dielectric constant films that could be used in sensors <semiconductor device>(Col-3, Ln 53-Col-4, Ln 13, Col-4, Ln 18).

It would be obvious to a person of ordinary skill in the art to add the surfactants of Brinker et al to the compositions of Yagihashi et al as functional equivalents to benefit from porous low dielectric films with reasonable expectation of success because Yagahishi is concerned about porous films with good dielectric properties (Para-0001).

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3. Claims 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brinker et al (US 6,387,453) in view of either Egami et al (JP 2002/030249) or Nobe et al (JP 2001-098218).

The disclosure on the composition and the method of forming a film by Brinker et al as set forth in rejection-3 under 35 USC 102(b) is herein incorporated.

The prior art fails to teach a semiconductor device containing the internal porous film per the claim. However, the prior art is suggestive of using the films in sensors that includes semiconductor devices (See Mihara, US 5,079,190, Col-1, Ln 14-16).

In the analogous art, Egami et al teach coating a low dielectric film of mesoporous silica over a silicon substrate forming a semiconductor device, the silica film being inlaid between the wirings of a multilevel interconnection (Abstract, Para 0044, 0051).

In the analogous art Nobe et al teach a silica base coating film formed from siloxane oligomers as interlayer insulating film in a semiconductor device (Abstract)

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings of Brinker with either Egami et al or Nobe et al to use the art film as an interlayer insulating layer with reasonable expectation of success, because the combined prior art teaching is suggestive of the claimed device.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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Claims 1, 6-7 and 9-10 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 6-8 of copending Application No. 10/810,360. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims refers to a composition containing one or more of alkoxysilanes with formula-1 and formula-2 overlap over one or more silane compounds with the formula $R_nSi(OR')_{4-n}$, wherein R-alkyl with 1-8 carbons, R'- alkyl with 1-4 carbons, and $n=0-3$, and they are drawn to similar compositions and their applications.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented. The examiner notes that the Claims 1-8 of the SI. No. 10/810,360 have been allowed on 10/20/2005.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on 8.30-6.00 Mon-Thu, 8.30-5.00 Alt Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMV
April 4, 2006.

Douglas McGinty

DOUGLAS MCGINTY
SUPERVISORY PATENT EXAMINER

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